

<b>Interview Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/658,062	Motoyoshi et al..	
	<b>Examiner</b>	<b>Art Unit</b>	
	Deborah Yee	1742	

All participants (applicant, applicant's representative, PTO personnel):

(1) Deborah Yee. (3) \_\_\_\_\_.

(2) John Kelly. (4) \_\_\_\_\_.

Date of Interview: 15 November 2005.

Type: a) Telephonic b) Video Conference  
c) Personal [copy given to: 1) applicant 2) applicant's representative]

Exhibit shown or demonstration conducted: d) Yes e) No.  
If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: all.

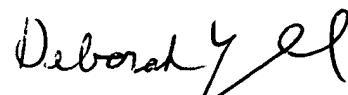
Identification of prior art discussed: all.

Agreement with respect to the claims f) was reached. g) was not reached. h) N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: *It was stated that prior art cannot get a tensile strength of 1700MPA or more with the newly proposed claimed composition. If the prior art obtains a tensile strength of 1700MPA or more, it does not have the newly proposed composition. Also the prior art teaches air cooling whereas present invention teaches water quenching. Attorney proposed amended claims are attached.*

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.



**DEBORAH YEE**  
**PRIMARY EXAMINER**

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

\_\_\_\_\_  
Examiner's signature, if required

## Summary of Record of Interview Requirements

### **Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record**

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### **Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews**

#### Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

#### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  

(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

#### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.

**ATTACHMENT**

**Application No. 10/658,062**

**Proposed Amended Claims**

1 (currently amended): A highly impact-resistant steel pipe characterized in that; the steel pipe consists essentially of, in mass, 0.19 to 0.35% C, 0.10 to 0.30% Si, where the Si amount is controlled in a range from (Mn/8 - 0.07) to (Mn/8 + 0.07), 0.5 to 1.60% Mn, not more than 0.025% P, not more than 0.01% S, 0.010 to 0.050% Al, 2 to 35 ppm B, 0.005 to 0.05% Ti, not more than 0.5% Cr, not more than 0.5% Mo, and the balance being Fe and unavoidable impurities, and the tensile strength TS of said steel pipe is 1,700 MPa or more, and the YR thereof, said YR being the ratio of the 0.1%-proof stress YS to said tensile strength TS (YS/TS), is 72% or less.

2 (currently amended): A highly impact-resistant steel pipe characterized in that; the steel pipe consists essentially of, in mass, 0.19 to 0.35% C, 0.10 to 0.30% Si, where the Si amount is controlled in a range from (Mn/8 - 0.07) to (Mn/8 + 0.07), 0.5 to 1.60% Mn, not more than 0.025% P, not more than 0.01% S, 0.010 to 0.050% Al, 2 to 35 ppm B, 0.005 to 0.05% Ti, not more than 0.5% Cr, not more than 0.5% Mo, and the balance being Fe and unavoidable impurities, and the tensile strength TS of said steel pipe is 1,800 MPa or more, and the YR thereof, said YR being the ratio of the 0.1%-proof stress YS to said tensile strength TS (YS/TS), is 70% or less.

3 (currently amended): A highly impact-resistant steel pipe characterized in that; the steel pipe consists essentially of, in mass, 0.19 to 0.35% C, 0.10 to 0.30% Si, where

the Si amount is controlled in a range from (Mn/8 - 0.07) to (Mn/8 + 0.07), 0.5 to 1.60% Mn,  
not more than 0.025% P, not more than 0.01% S, 0.010 to 0.050% Al, 2 to 35 ppm B,  
0.005 to 0.05% Ti, not more than 0.5% Cr, not more than 0.5% Mo, and the balance being Fe  
and unavoidable impurities, and the tensile strength TS of said steel pipe is 1,900 MPa or  
more, and the YR thereof, said YR being the ratio of the 0.1%-proof stress YS to said tensile  
strength TS (YS/TS), is 68% or less.

4 (currently amended): A highly impact-resistant steel pipe characterized in  
that; the steel pipe consists essentially of, in mass, 0.19 to 0.35% C, 0.10 to 0.30% Si, where  
the Si amount is controlled in a range from (Mn/8 - 0.07) to (Mn/8 + 0.07), 0.5 to 1.60% Mn,  
not more than 0.025% P, not more than 0.01% S, 0.010 to 0.050% Al, 2 to 35 ppm B, 0.005  
to 0.05% Ti, not more than 0.5% Cr, not more than 0.5% Mo, and the balance being Fe and  
unavoidable impurities, and the tensile strength TS of said steel pipe is 2,000 MPa or more,  
and the YR thereof, said YR being the ratio of the 0.1%-proof stress YS to said tensile  
strength TS (YS/TS), is 66% or less.

Claim 5: (canceled).

6 (original): A highly impact-resistant steel pipe according to any one of  
claims 1 to 4, characterized in that the dislocation density of said steel pipe is in the range  
from  $10^{10}$  to  $10^{14}/\text{mm}^2$ .

Claim 7: (canceled).

8 (currently amended): A highly impact-resistant steel pipe according to claim  
7 any one of claims 1 to 4, characterized in that the steel of said steel pipe further contains  
consists essentially of, in mass, one or more components selected from among the group of  
0.005 to 0.050% Nb, 0.005 to 0.070% V, 0.005 to 0.5% Cu, 0.1 to 0.5% Mo, 0.1 to 0.5% Ni,  
not more than 0.01% Ca, and not more than 0.1% rare earth metals (REMs).

9 (currently amended): A highly impact-resistant steel pipe according to any one of claims 1 to ~~5~~ 4, characterized in that 95% or more of the microstructure of said steel pipe is ~~transformed into martensite by induction hardening and the prior austenite grain size number of said steel pipe is #6 or more.~~

10 (currently amended): A highly impact-resistant steel pipe according to any one of claims 1 to ~~5~~ 4, characterized in that said steel pipe has a round or square sectional shape.

11 (currently amended): A method for producing a highly impact-resistant steel pipe according to any one of claims 1 to ~~5~~ 4, characterized in that said steel pipe consists essentially of containing, in mass, 0.19 to 0.35% C, 0.10 to 0.30% Si, 0.5 to 1.60% Mn, not more than 0.025% P, not more than 0.01% S, 0.010 to 0.050% Al, 2 to 35 ppm B, and 0.005 to 0.05% Ti as indispensable components, and further one or more components selected from among the group of 0.005 to 0.050% Nb, 0.005 to 0.070% V, 0.005 to 0.5% Cu, 0.1 to 0.5% Mo, 0.1 to 0.5% Ni, not more than 0.01% Ca, and not more than 0.1% rare earth metals (REMs), is subjected to induction heating and then water quenching.

12 (original): A method for producing a highly impact-resistant steel pipe according to claim 11, characterized in that the cooling rate of said water quenching is 100°C/sec. or higher.

13 (original): A method for producing a highly impact-resistant steel pipe according to claim 11 or 12, characterized in that the cooling water temperature of said water quenching is 35°C or lower.

14(new): A method for producing a highly impact-resistant steel pipe according to claim 11 or claim 12 wherein 95% or more of the microstructure of said steel

pipe is transformed into martensite by said induction heating followed by said water quenching and the prior austenite grain size number of said steel pipe is #6 or more.

15 (new): A highly impact-resistant steel pipe according to any one of claims 1 to 4, wherein the maximum content of Mn is 1.44%.

16 (new): A highly impact-resistant steel pipe according to any one of claims 1 to 4, wherein the maximum content of Cr is 0.15%.

#### **SUPPORT FOR AMENDED CLAIMS**

##### **Claims 1 to 4**

In amended independent claims 1 to 4, the contents of C, Si, Mn, P, S, Al, B and Ti are supported by original dependent claim 7. The balance being Fe and unavoidable impurities is disclosed in the specification, e.g., at page 17 lines 3-4.

Support for --Si amount is controlled in a range from  $(\text{Mn}/8 - 0.07)$  to  $(\text{Mn}/8 + 0.07)$ -- may be found in original claim 5.

In amended independent claims 1 to 4, support for the limitation --not more than 0.5% Cr-- is disclosed in the specification, e.g., at page 4, lines 19-23. Cr is disclosed as an arbitrary component (not necessary) in the steel composition (page 4, line 19) and the maximum amount of Cr, if present in the steel composition, is 0.5% Cr (page 4, line 22). Thus, there is either no Cr in the steel composition or if Cr is present in the steel composition, the maximum Cr is limited to 0.5%.

In amended claims 1 to 4, support for the claim limitation --not more than 0.5% Mo-- is disclosed in the specification, e.g., at page 4, lines 19-23. Mo is disclosed as an arbitrary component (not necessary) in the steel composition (page 4, line 19) and the maximum amount of Mo, if present in the steel composition, is 0.5% Mo (page 4, line 22).

Thus, there is either no Mo in the steel composition or if Mo is present in the steel composition, the maximum amount of Mo is limited to 0.5%.

**Claim 6**

The high dislocation density of dependent claim 6 is the result of rapid cooling caused by water quenching of the induction heated steel. See specification page 9, line 1 to page 10, line 9. See, e.g., page 9, lines 14-19 which discloses water quenching causes the transformation of austenite to martensite to occur instantaneously and the dislocation density of the martensite structure increases drastically. Page 9, lines 32-35 discloses that the high dislocation density results in low YS and maintains a high TS. Page 9, line 36 to page 10, line 3 discloses that water quenching at 100°C/sec (6,000°C/min) or higher results in high TS and low YR.

**Claims 8 to 11**

The dependencies of dependent claims 8 to 11 have been revised.

**Claim 9**

Dependent claim 9 has been amended to make it a clear product claim by deleting process type limitations from the claim.

**Claim 14**

New dependent method claim 14 is based upon original dependent claim 9.

**Claim 15**

The maximum Mn content of 1.44% in new dependent claim 15 is supported by the inventive examples in Table 1 at page 14 of the specification and Table 3 at page 16 of the specification where 1.44% Mn is the highest Mn content of the inventive examples.

### Claim 16

The maximum Cr content of 0.15% Cr in new dependent claim 16 is supported by the inventive examples in Table 1 at page 14 of the specification and Table 3 at page 16 of the specification where 0.15 % Cr is the highest Cr content of the inventive examples.

### TENSILE STRENGTH

The present invention is directed to a low YR (yield ratio) in combination with a very high TS (tensile strength) achieved by the specific steel composition of the present invention with the steel pipe being water quenched after induction heating. The minimum tensile strength of independent claims 1 to 4 is as follows.

claim 1	-	1700 MPa	=	173.9 kgf/mm <sup>2</sup>
claim 2	-	1800 MPa	=	183.5 kgf/mm <sup>2</sup>
claim 3	-	1900 MPa	=	193.7 kgf/mm <sup>2</sup>
claim 4	-	2000 MPa	=	203.9 kgf/mm <sup>2</sup>

The conversion factor is 1 kgf/mm<sup>2</sup> = 9.81 MPa or MPa/9.81 = kgf/mm<sup>2</sup>.